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The Infectious Diseases in their Relations to the Public Schools.

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Certain diseases, known as infectious, frequently occur during school life. When fully developed they present certain definite and well-marked symptoms, which, in their general outlines at least, should be familiar to every teacher; for these diseases often make their first appearance in the public schools, which afford admirable facilities for their transmission from one pupil to another, and thence throughout the community at large.

Many an epidemic of scarlet-fever, measles, or diphtheria might be entirely avoided, or at least greatly curtailed in the extent of its prevalence, if the teachers of the public schools were able to recognize the appearance of these diseases in the school-room. Unfortunately, however, those symptoms which mark the onset of an infectious disease are often vague and ill-defined; and it is frequently difficult, and sometimes impossible, to decide just which disease is about to make its appearance. There are, however, certain danger signals which should always

arrest the attention of the teacher and lead her to suspect that the illness may be due to causes dangerous to the health of the other pupils ; for example : A child appears listless and dull, shows marked inattention to study, and is disinclined to play as usual ; or, he may be unusually restless, and perhaps complain of headache, sore throat, or of pain in the back or limbs ; fever, with great thirst, may be present, or he may suffer from nausea and vomiting, or from a cough, which may be teasing, and persistent, metallic, or paroxysmal in character. These symptoms occurring in a previously healthy child should place the teacher on her guard and lead her to ask for the opinion of the family physician. Such action can lead to no evil results, even if the indisposition should be only temporary while an outbreak of contagious disease might, in this way, often be prevented. An excess of caution on the part of the teacher cannot be blamable ; certainly a child suffering from these symptoms is better off at home than in any school-room.

The infectious diseases are caused by the introduction into the body from without of certain morbid agents, called *viruses*, which occasion distinct symptoms characteristic of the separate diseases which they produce. Although these diseases have many symptoms in common, it is to be remembered that each is caused by its own specific poison. The morbid agent, for example, which causes an outbreak of scarlet fever or measles, will never give rise to an epidemic of diphtheria or typhoid fever. Each disease has its separate exciting cause, is self-limited, and as a rule, runs a definite and characteristic course which we are seldom able to abridge.

At present but little is known concerning the exact nature of the morbid agents which produce the various infectious diseases. We, however, know that these poisons have a distinct history of incubation, of development, and of reproduction, and also that certain conditions are necessary for their existence and transmission. The germs of yellow-fever and cholera thrive only in a warm climate; cold is fatal to their life, while the virus of small-pox finds a congenial field for its development in a colder latitude. Some germs, as those of scarlet-fever, are best disseminated in a dry state, while others require moisture for their full development. Some of these morbid agents are given off and absorbed by the alimentary canal; others enter the system through the inspired air. Some of the infectious diseases are communicated directly from the sick to the well; while for the transmission of others, actual contact with the sick is unnecessary. Every thing relating to the growth and dissemination of these poisons is of the utmost importance as aiding us in their destruction by proper disinfection.

An epidemic of an infectious disease is a terrible occurrence in any community, not only by reason of the deaths which occur, but also from loss of time, activity, and means, of the afflicted families. These diseases are largely avoidable; and every precaution must be taken to prevent their appearance and transmission. Improper hygienic conditions, either at home or at school, form an important element in the development and spread of this class of diseases, and also increase the liability to a fatal result when the individual is once attacked. Hence the importance of proper sanitary surroundings and the neces-

sity for prompt isolation of every case of contagious disease. The laws of Massachusetts relative to this subject read as follows (Chap. 98, Acts of 1884) :

SECTION I. When a householder knows that a person within his family is sick of small-pox, diphtheria, scarlet fever, or *any other disease dangerous to the public health*, he shall immediately give notice thereof to the selectmen or board of health of the town in which he dwells ; and upon the death, recovery, or removal of such persons, the rooms occupied and the articles used by him shall be disinfected by such householder in a manner approved by the board of health. Any person neglecting or refusing to comply with either of the above provisions shall forfeit a sum not exceeding one hundred dollars.

SECTION II. When a physician knows that a person whom he is called to visit is infected with small-pox, diphtheria, scarlet fever, or *any other disease dangerous to the public health*, he shall immediately give notice thereof to the selectmen or board of health of the town ; and if he refuses or neglects to give such notice, he shall forfeit for each offense not less than fifty nor more than two hundred dollars.

SECTION III. The boards of health in the several cities and towns shall cause a record to be kept of all reports received in pursuance of the preceding sections ; and such record shall contain the names of all persons who are sick, the localities in which they live, the diseases with which they are affected, together with the date and the names of the persons reporting any such cases. The boards of health shall give the school committee information of all cases of contagious disease reported to them according to the provisions of this act.

The great majority of cases of infectious disease occur among children ; and the spread of these diseases throughout the community is due, in no small degree, to the intercourse of children attending the public schools. To re-

duce this danger to its minimum the Public Statutes of Massachusetts (Chap. 198, Acts of 1885) provide that,—

“ The school committee shall not allow any pupil to attend the public schools while any member of the household to which such pupil belongs is sick of small-pox, diphtheria, or scarlet-fever, or during a period of two weeks after the death, recovery, or removal of such sick person ; and any pupil coming from such household shall be required to present, to the teacher of the school the pupil desires to attend, a certificate, from the attending physician or board of health, of the facts necessary to entitle him to admission in accordance with the above regulation.”

Some towns go even further than this, and require their teachers to be constantly on the watch for the occurrence of any case of contagious disease. The General Regulations of the Salem public schools instruct the teachers to make semi-weekly inquiries of the scholars under their charge as to the existence of such diseases in the houses from which they come. Another important means of preventing the spread of infectious diseases in and by means of the public schools will be secured when the cities and larger towns appoint one or more school physicians, whose special work shall be to guard against the occurrence of contagious diseases in the schools, as well as to care for the health of the pupils and the sanitary arrangement of the school building and their surroundings. This system of medical supervision has been in operation for several years in Brussels, Belgium ; and during that time no infectious disease has reached the height of an epidemic, although other cities of Europe have been cruelly scourged.

We have now to consider some of the more important

symptoms which mark the early period of the transmissible diseases. For convenience these diseases may be divided as follows :

I. Those diseases known as contagious. These are all communicated directly from the sick to the well, and may be subdivided into two classes :

A. *The Eruptive Contagious Diseases*,—

- (1) Scarlet-fever.
- (2) Measles.
- (3) German Measles (Röthelen).
- (4) Small-Pox.
- (5) Chicken-Pox.

B. *The Non-Eruptive Contagious Diseases*,—

- (1) Diphtheria.
- (2) Whooping-cough.
- (3) Mumps.

II. Those infectious diseases which are transmitted by other means than by actual contact with the sick :

- (1) Typhoid Fever.
- (2) Yellow Fever
- (3) Cholera.

A. THE ERUPTIVE CONTAGIOUS DISEASES.

These diseases have several features in common. They generally occur but once in the same individual, and are all characterized by a period of invasion, of longer or shorter duration, during which time the poison seems to remain latent, by fever of more or less intensity preceding an eruption, which presents certain distinctive features in each disease, and which disappears, together with the

febrile malady, after a certain length of time, unless the patient yields to the virulence of the disease before this period has elapsed.

Scarlet-Fever.—This disease, also known as Scarlatina and Canker Rash, is usually abrupt in its commencement. The period of invasion is generally from twelve to twenty-four hours, during which time there is high fever, great thirst, a very rapid pulse, pain in the back and limbs, sore throat, and often vomiting and convulsions. One or two days after the beginning of the fever a bright, scarlet rash makes its appearance. This is usually first seen upon the neck and chest, but soon extends over the entire surface of the body, remains visible for a few days and then gradually disappears, leaving an abundance of fine scales upon the skin. These contain the specific poison of contagion, and are so delicate as to be carried in every current of the air, and can easily be taken into the system through the lungs.

Measles.—The symptoms preceding this disease are fever, red watery eyes, frequent sneezing, flow from the nose, and a hoarse metallic cough. On the fourth day from the commencement of these symptoms an eruption appears, first upon the forehead and face, then extending over the body. This consists of small, crescent-shaped blotches, often bluish in color, and composed of little fine dots crowded together, between which is seen the natural color of the skin.

Rötheln.—Another disease, popularly known as “German Measles,” bears some resemblance to measles, and occasionally makes its appearance in the school-room. Prodromal symptoms are often absent, the appearance of

the rash being the first symptom noticeable. This usually consists of minute red points, scattered over the surface of the body. Sometimes these are collected together in patches, which are irregular in their outlines, thus differing from the crescent-shaped eruption of measles. This disease is usually quite mild in character.

Small-Pox.—The onset of this dread disease is usually marked by a distinct chill, great pain in the loins, high fever, and vomiting. The severity of the initial symptoms subside about the fourth day, when the characteristic eruption makes its appearance upon the lips, chin, and forehead, thence extending to the body and limbs. The eruption at first consists of small red spots, which soon become changed to vesicles with a slight depression in the center. These afterward become pustules, and when fully developed measure about one-third of an inch in diameter.

Vaccination, when properly performed, forms an almost perfect protection against this disease. Concerning its value as tested in London, Dr. Buchanan remarks :

“ In 1881, among the 55,000 children who had not been vaccinated, there were 782 deaths from small-pox ; among the 861,000 children who had been vaccinated there were 125 deaths from small-pox. If the London children under ten, who were not vaccinated, had had the protection which the current vaccination gives, not 782 of them, but at the outside *nine*, would have died of small-pox during the year.”

The laws of Massachusetts relative to the subject of vaccination read as follows :

“ Parents and guardians shall cause their children and wards to be vaccinated before they attain the age of two years, and revaccin-

ated when the selectmen or mayor and aldermen shall, after five years from the last vaccination, require it. For every year's neglect the party offending shall forfeit five dollars.

“The selectmen and mayor and aldermen shall require and enforce the vaccination of all the inhabitants, and, when in their opinion the public health requires it, the revaccination of all the inhabitants who do not prove to their satisfaction that they have been successfully vaccinated or revaccinated within five years. Every person over twenty-one years of age, not under guardianship, who neglects to comply with any such requirement, shall forfeit five dollars.”—(Chap. 80, Sec. 51, 52.)

“The school committee shall not allow a child who has not been duly vaccinated to be admitted to or connected with the public schools.”—(Chap. 47, Sec. 9.)

Chicken-Pox.—Another eruptive disease often met with in the school-room, is known as Varicella or Chicken-Pox. This affection is usually quiet and mild in its manifestations, although it is quite contagious. The eruption is generally preceded by slight constitutional disturbances for twenty-four hours, when small, irregularly-shaped vesicles make their appearance upon the body, neck, and face. These remain visible from five to seven days, become covered with light-brown scabs, and then disappear, with rarely any pitting. This disease has no relation to small-pox.

B. THE NON-ERUPTIVE CONTAGIOUS DISEASES.

Diphtheria.—This is by far the most fatal and wide spread of the diseases of this class, and is often quite irregular in its development. The early symptoms may consist of slight fever, headache, difficulty in swallowing, and a general feeling of lassitude. The characteristic

objective symptom is the presence of a greyish-colored membrane on the reddened mucous membrane of the throat. This extends over the tonsils, the soft palate, and often downward into the larynx, or upward into the nostrils. The appearance of this membrane in the throat of a pupil calls for his immediate removal from the school-room and isolation from other children.

Whooping-Cough.—This disease is generally preceded for one or two weeks by the usual symptoms of a common cold. The characteristic spasmodic cough afterward makes its appearance, and consists of a number of short, hurried expirations, followed immediately by a long-drawn inspiratory whoop. These paroxysms of coughing occur at varying intervals during the twenty-four hours, and are characteristic of the fully-developed disease.

Mumps.—This disease is characterized by slight fever, restlessness, and by pain and swelling behind the lower jaw just below the ear. This slightly interferes with the movements of the jaw, so that the mouth can be opened only with difficulty, and it usually increases in size during the first three or four days. In about ten days the face resumes its natural appearance.

II. Those infectious diseases which are communicated by other means than by actual contact of the sick with the well, include typhoid-fever, yellow-fever, and cholera. These diseases, as a rule, prevail only during the warm months, and spread by means of separate morbid agents which are received into the body through the medium of the inspired air or by the agency of food and drink. These are not communicated directly from the sick to the well, but from exposure to a common source of infection;

for example, a well of water may become contaminated by the discharges of a typhoid-fever patient,—every individual who drinks from this well will be very liable to suffer from typhoid fever, even if he has no intercourse whatever with the patient; while, on the other hand, those in immediate charge of the sufferer run but slight risk from the disease unless they also partake of the common source of infection; namely, the contaminated water.

This illustrates a very common source of danger in many towns and villages, where the vaults and wells are sometimes in close proximity to each other. Pollution of the water is one of the most common causes of epidemics of typhoid-fever.

In New England cholera and yellow-fever are so seldom met with that we will not pause to describe them. Typhoid-fever, however, is of frequent occurrence.

This disease, unlike those of the preceding class, is quite insidious in its onset, and is marked by quite a long period of invasion, during which time the symptoms are vague, and seldom well-defined. The child does not sleep well, loses his appetite, is disinclined to play, complains of feeling tired and languid and of headache; nausea, pain in the back and limbs; slight fever is usually present in the afternoon, and often diarrhœa and bleeding from the nostrils. These symptoms continue with gradually-increasing severity for several days, until the child is too ill to leave the bed, when the disease becomes fully established and runs its usual course, lasting from two to three weeks, or even longer.

The question of how long children shall be excluded from the public schools on account of the infectious dis-

eases has been answered by Mr. A. J. Abele, board inspector for Nottingham, and by a convention of English physicians, in the following table. The time is to be counted from the beginning of the attack, unless otherwise noted ;

<i>Mr. Abele.</i>		<i>Convention of Physicians.</i>
Small-pox,	8 weeks.	After all the scabs have completely fallen off.
Whooping-cough,	8 “	6 weeks provided the cough has disappeared completely.
Scarlet-fever,	7 “	Not less than 6 weeks, after the scalding of the skin is over and there is no trace of pain in the throat.
Diphtheria, . .	6 “	Not less than 3 weeks after complete recovery.
Measles, . . .	6 “	Not less than 3 weeks, when the scaling of the skin and coughing are over.
Typhoid, . . .	6 “	— ?
Chicken-pox, . .	3 “	— ?
Mumps, . . .	3 “	— ?